REMARKS

Claims 1-2, 4-5, and 7-23 are pending.

Claims 1-2, 4-5, and 7-23 are rejected.

In the office action dated June 9, 2008, claims 1-2, 4-5, 7-12 15-18 and 22 are rejected under 35 USC §103(a) as being unpatentable over Bour EP 977,279 in view of a paper by Wu et al. entitled "Superior radiation resistance in InGaN alloys"), and Schetzina U.S. Patent No. 5,679,965; claims 19-21 are rejected under 35 USC §103(a) as being unpatentable over Bour in view of Wu, Nishii U.S. Publication No. 20030205721 and Schetzina; and claim 23 is rejected under 35 USC §103(a) as being unpatentable over Bour in view of Wu and Schetzina. Claims 1, 19, 22 and 23 are base claims.

On 10 August 2008, the undersigned faxed a proposed response to Examiner Gardner. On 12 August 2008, the undersigned discussed the proposed response during a telephonic interview with Examiner Gardner and her supervisor, Examiner Nichols. Examiners Gardner and Nichols are thanked for granting the interview and providing their comments during the interview. A summary of the telephonic interview is provided below.

Claim 24 is new. New claim 24 recites a solar cell assembly comprising:

a sapphire cover;
a GaN transparent conductive coating (TCC) as front collector, the GaN TCC formed on the sapphire cover; and
a multjunction InGaN solar cell grown on a GaN layer of the TCC;
wherein the GaN TCC provides a defect-free surface upon which the InGaN solar cell is grown.

The applicant discloses that the front collector of GaN TCC on a sapphire cover produces a defect-free surface for growing a multijunction InGaN solar cell. There is no

lattice mismatch with the InGaN solar cell. This is an unexpected result, which is clearly recited in new claim 24.

The unexpected result provides benefits. It allows the InGaN solar cell to be grown on the TCC/sapphire cover, thus forming a unitary assembly. No adhesive is needed to attach the cover to the solar cell. No modifications to the solar cell have to be made to grow it on a cover.

The documents made of record do not teach or suggest this unexpected result. Wu et al. is silent about covers for their InGaN solar cell. They are also silent about lattice mismatches with substrates upon which their solar cell is grown.

Wu et al. mention problems with high-energy particle damage to InGaN solar cells, but offer no solutions. Wu et al. point out that "Work on InGaN has not yet progressed to the point of making complete devices, so we have chosen to study here basic material properties" (p. 6478, left column).

Thus, the applicant discloses and claims a device that Wu mentions as "not yet progressed to the point."

Of the Wu paper and the patents to Bour and Schetzina, only the Wu paper provides evidence of InGaN solar cells. Bour[1] and Schetzina[2] relate to laser diodes.

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[1] Bour discloses a laser diode having a sapphire substrate 305, a thin amorphous buffer layer 310 of GaN, and thick and active InGaN layers 320 and 330. The buffer layer 310 serves as a nucleation layer. Paragraph 28 says the thick layer 320 allows higher indium content to be used in the active layer 330. Growing the active layer330 on the thick layer 320 results in less lattice mismatch than growing the active layer 330 directly on the GaN buffer layer 310.

[2] Schetzina discloses a semiconductor surface emitting laser having a lattice matched structure including a sapphire substrate, and a GaN layer, graded AlGaN layers and InGaN active layer. A multiple quantum well may be used instead of the graded layers of AlGaN.

Moreover, Bour and Schetzina are cited to show work in solving lattice mismatches. However, as the applicant has found, such work is not necessary for the combination of the sapphire cover/GaN TCC/InGaN solar cell.

Thus, new claim 24 should be allowed over the documents made of record. So too should claims 5, 7-14 and 16, which have been amended to depend from new claim 24. Claims 17-18 and 22- 23 have been cancelled.

Claim 19 has been amended to recite a method of forming a unitary multi junction solar cell assembly. The method includes forming a transparent conductive coating including gallium nitride on a sapphire cover; and growing a solar cell including a plurality of gallium indium nitride junction layers on the transparent conductive coating without taking any measures to correct for lattice mismatch. Amended claim 19 and its dependent claims 20-21 should be allowed over the combination of Bour, Wu and Schetzina for the reasons above.

Claim 1 has been amended. Amended claim 1 and its dependent claims 2, 4 and 15 should be allowed for the reasons above.

The amendments and arguments above (with slight modification) were faxed to Examiners Gardner and Nichols as a part of the proposed response. During the telephonic interview, new claim 24 was discussed. Examiner Nichols indicated that, at first glance, the cited documents do not teach or suggest the growing of an InGaN solar cell on a GaN TCC. However, Examiner Nichols did raise a concern over a paper by Hiramatsu et al., which is cited in paragraph 43 of the Bour patent.

In response to this concern, paragraph 43 of the Bour patent has been reviewed further. Paragraph 43 in Bour addresses the problems of growing indium gallium nitride ternary alloys with ever increasing indium content. In the region where the percentage of indium and gallium start becoming equal, there are high strains induced in the lattice.

The Hiramatsu paper has also been reviewed. The paper describes a semiconductor laser including an InGaN active layer between GaN and AlGaN cladding layers. The paper notes that indium mole fraction is low during initial stages of growth on a GaN epilayer and increases as the GaN layer becomes thicker. The authors attribute this affect to strain of the lattice mismatch. The Hiramatsu paper also looks at InGaN/GaN and InGaN/AlGaN heterostructures. A copy of the Hiramatsu paper is being submitted with this response.

If the Examiner has any questions or wishes to further discuss this application, she is encouraged to contact the undersigned.

Respectfully submitted,

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